

Data & Things

Title	Data & Things
Semester	F2024
Master programme in	Computer Science
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at ruc.dk

REGISTRATION AND STUDY ADMINISTRATIVE

Registration	You register for activities through stads selvbetjening during the announced registration period, which you can see on the Study administration homepage. When registering for courses, please be aware of the potential conflicts and overlaps between course and exam time and dates. The planning of course activities at Roskilde University is based on the recommended study programmes, which should not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programmes, an overlap of lectures or exam dates may occur depending on which courses you choose.
Number of participants	
ECTS	10
Responsible for the activity	Jens Ulrik Hansen (jensuh@ruc.dk) Hua Lu (luhua@ruc.dk)
Head of study	Henrik Bulskov (bulskov@ruc.dk)
Teachers	
Study administration	IMT Registration & Exams (imt-exams@ruc.dk)
Exam code(s)	U60058

ACADEMIC CONTENT

Overall objective	Advanced data solutions and complex device systems.
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Detailed description of content

This course focuses on building data centric applications that utilize data to create new insights or features. In doing this, we need to understand how to analyze data and create statistical and machine learning models, as well as learning how to process, transform, and manage data. In managing data, we will go beyond the classical relational databases and cover topics such as parallel and distributed data systems, partial and graph databases, and data from IoT devices. Moreover, we will cover how to put data products, such as machine learning models, into production and monitor their performance (ML Ops). Thus, this course cover both hands-on introductions to data science, machine learning, data engineering, ML Ops, as well as building complex data centric systems that may utilize IoT devices and external data sources as input to statistical and machine learning models that may result in visualizations, features, or effects into the environment.

Course material and Reading list

Course materials will consist of part of books, papers, etc. The specific materials will be announced on Moodle for each lecture.

Overall plan and expected work effort

During the run of the course the students may hand in a number of short topical assignments (hand-ins).

Hand-in info:

- The hand-in will consists of answers to selected exercises - these will be selected among those that have already been done in class. Only some of the exam topics will have hand-in exercises.
- The list of selected hand-in exercises will be made public on the last day of class.
- The hand-in should be in the format of a Jupyter Notebook. A template Jupyter notebook will be provided on Moodle.
- The students may hand in in groups, which Eksamen.ruc.dk should be set up for. In that case, the students can only hand in one joint Jupyter Notebook per group.

The course will have a total workload of 270 hours consisting of approximately:

- 76 hours of lectures and exercises,
- 140 hours of preparation over an 8 week course period and
- 54 hours for the exam and preparation before the course.

Format

Evaluation and feedback

Evaluation form to be filled out (anonymously) plus open discussion on the last course day

Programme

ASSESSMENT

Overall learning outcomes

After completing this activity, students will be able to:

- analyse, implement, and verify complex data solutions to solve problems within complex IT systems.
- demonstrate knowledge of modern data storages, and data engineering and science.
- understand and implement solutions that integrate computation into the environment and use serval devises and systems.

	design and implement coordination for systems with many software and hardware components and interfaces suitable for ubiquitous computing.
Form of examination	Individual oral exam based on a written product.. The character limit of the written product is maximum 48.000 characters, including spaces. The character limits include the cover, table of contents, bibliography, figures and other illustrations, but exclude any appendices. Time allowed for exam including time used for assessment: 20 minutes. The assessment is an overall assessment of the written product(s) and the subsequent oral examination. Permitted support and preparation materials for the oral exam: All. Assessment: 7-point grading scale. Moderation: Internal co-assessor.
Form of Re-examination	Samme som ordinær eksamen / same form as ordinary exam
Type of examination in special cases	
Examination and assessment criteria	At the beginning of the exam, the student draw a random number. Each number will correspond to an exam topic. (The list of exam topics roughly corresponds to the different classes and will be announced at the beginning of the course). The student will then present on the topic (3-5 min), followed by questions about it from the examiners (5-10 min). At the end, the examiners might relate their questions to the full curriculum (i.e., some of the other exam topics). For each of the possible exam topics (curriculum), the student is expected to know the central concepts, methods, theories, and problems discuss in class and be able to explain and exemplify them. Moreover, for those exam topics where there are hand-in exercises, the student will be expected to be able to explain how they would solve (or solved) the exercise (and details of what code would be needed (or that they used)).
Exam code(s)	Exam code(s) : U60058

Course days:

Hold: 1

Data & Things (COMP)

time 30-01-2024 08:15 til
30-01-2024 12:00

location 44.2-40 - theory room (50)

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things (COMP)

time 05-02-2024 08:15 til
05-02-2024 12:00

location 15.0-003 - auditorie 15 (68)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 07-02-2024 08:15 til
07-02-2024 16:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 09-02-2024 08:15 til
09-02-2024 12:00

location 44.2-40 - theory room (50)

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things (COMP)

time 12-02-2024 08:15 til
12-02-2024 12:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 14-02-2024 08:15 til
14-02-2024 16:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 16-02-2024 08:15 til
16-02-2024 12:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 19-02-2024 08:15 til
19-02-2024 12:00

location 44.2-40 - theory room (50)

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things (COMP)

time 21-02-2024 08:15 til
21-02-2024 12:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 23-02-2024 08:15 til
23-02-2024 12:00

location 44.2-40 - theory room (50)
Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things (COMP)

time 26-02-2024 08:15 til
26-02-2024 12:00
location 44.2-40 - theory room (50)
Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 28-02-2024 08:15 til
28-02-2024 12:00
location 44.2-40 - theory room (50)
Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 01-03-2024 08:15 til
01-03-2024 12:00
location 44.2-40 - theory room (50)
Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 04-03-2024 08:15 til
04-03-2024 12:00
location 44.2-40 - theory room (50)
Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 06-03-2024 08:15 til
06-03-2024 12:00

location 44.2-40 - theory room (50)

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things (COMP)

time 08-03-2024 08:15 til
08-03-2024 12:00

location 44.2-40 - theory room (50)

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things - Questions (COMP)

time 13-03-2024 08:15 til
13-03-2024 12:00

location 44.2-40 - theory room (50)

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things - Hand-in (COMP)

time 15-03-2024 10:00 til
15-03-2024 10:00

forberedelsesnorm ikke valgt

forberedelsesnorm D-VIP ikke valgt

Data & Things - Oral examination (COMP)

time 21-03-2024 08:15 til
21-03-2024 18:00

Teacher Hua Lu (luhua@ruc.dk)
Jens Ulrik Hansen (jensuh@ruc.dk)

Data & Things - Oral examination (COMP)

time 22-03-2024 08:15 til
22-03-2024 18:00

Teacher Jens Ulrik Hansen (jensuh@ruc.dk)
Hua Lu (luhua@ruc.dk)

Data & Things - Reexam - Hand-in (COMP)

time 08-08-2024 10:00 til
08-08-2024 10:00

forberedelsesnorm ikke valgt

forberedelsesnorm D-VIP ikke valgt

Data & Things - Oral reexamination (COMP)

time 15-08-2024 08:15 til
15-08-2024 18:00

forberedelsesnorm ikke valgt

forberedelsesnorm D-VIP ikke valgt